

AP Statistics
Chapter 4 In-class Review

Name: Key
Date: _____

1. Let $\mu_x = 3.5$, $\mu_y = 9.3$, $\sigma_x = 1.2$, $\sigma_y = 2.4$

Find each of the following:

a) μ_{3x+6}

$$3 \cdot \mu_x + 6$$

$$3(3.5) + 6$$

$$= 16.5$$

$$\sigma_{3x+6}$$

$$\sigma_{3x+6}^2$$

$$3^2 \sigma_x^2$$

$$9(1.2^2) = \sqrt{12.96}$$

$$= 3.6$$

b) $\mu_{x-8.2+1.5y}$

$$\mu_x - 8.2 + 1.5 \cdot \mu_y$$

$$3.5 - 8.2 + 1.5(9.3)$$

$$= 9.25$$

$$\sigma_{x-8.2+1.5y}$$

$$\sigma_{x-8.2+1.5y}^2$$

$$= \sigma_x^2 + 1.5^2 \sigma_y^2$$

$$= \sigma_x^2 + \sigma_{1.5y}^2$$

$$= \sigma_x^2 + 1.5^2 \sigma_y^2$$

$$= \sqrt{14.4} = 3.795$$

b) μ_{4x+2y}

$$4 \cdot \mu_x + 2 \cdot \mu_y$$

$$4(3.5) + 2(9.3)$$

$$= 32.6$$

$$\sigma_{4x+2y}$$

$$\sigma_{4x+2y}^2 = \sigma_{4x}^2 + \sigma_{2y}^2$$

$$= 4^2 \sigma_x^2 + 2^2 \sigma_y^2$$

$$= 16(1.2^2) + 4(2^2)$$

$$= \sqrt{46.08} = 6.79$$

2) $P(A) = 0.61$ and $P(B|A) = 0.4$

a) What is $P(A \cap B)$?

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$$0.4 = \frac{P(A \cap B)}{0.61}$$

$$P(A \cap B) = 0.244$$

b) Are A and B disjoint?

No!

$$P(A \cap B) \neq 0$$

3) A and B are independent events. $P(A) = 0.73$ and $P(A \cap B) = 0.24$. What is $P(B)$?

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$$P(B) = \frac{0.24}{0.73} = 0.329$$

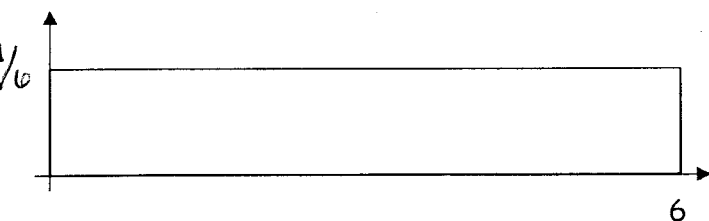
4) $P(M) = 0.36$ and $P(D|M) = 0.27$. what is $P(D \cap M)$?

$$P(D|M) = \frac{P(D \cap M)}{P(M)}$$

$$0.27 = \frac{P(D \cap M)}{0.36}$$

$$P(D \cap M) = 0.097$$

5) A continuous random variable X has the distribution as shown below.



Find:

a) $P(0.2 \leq x \leq 3) = (2.8)(\frac{1}{6})$ b) $P(2.5 < x < 4.3) = (1.8)(\frac{1}{6})$ c) $P(x \in 1.3)$

0.4667

0.3

$0!$

6. Discrete Random Variable Q has the distribution shown below.

Q	0	1	2	3	4	5
P(Q)	0.2	0.4	0.1	0.05	0.15	0.1

a) Find $\mu_Q = E(Q) = 1.85$

b) Find $\sigma_Q = 1.652$

7. The probability of picking a blue chip out of a bag is 0.26. I pick 4 chips out of the bag (with replacement).
 $P(B) = 0.26$ $n = 4$

a) Create a probability distribution.

x	P(x)
0	$(4nC0)(0.26^0)(0.74^4) = 0.2999$
1	$(4nC1)(0.26^1)(0.74^3) = 0.4214$
2	$= 0.2221$
3	$= 0.0520$
4	$= 0.0046$

b) Find $P(X \leq 3) = 0.9954$

c) Find $P(X = 1) = 0.4214$

d) Find $P(1 \leq X < 4) = 0.6955$

e) Find $P(X \neq 2) = 1 - P(X = 2)$

$= 1 - 0.2221$

$= 0.7779$

8. $P(A) = 0.26$, $P(B) = 0.41$, $P(A \cap B) = 0.1$

a) Find $P(A \cup B)$.

$$= P(A) + P(B) - P(A \cap B)$$

$$= 0.26 + 0.41 - 0.1 = 0.57$$

c) Are A and B disjoint?

$$\text{NO, } P(A \cap B) \neq 0$$

b) Find $P(B|A) = \frac{P(A \cap B)}{P(A)}$

$$= \frac{0.1}{0.26} = 0.3846$$

d) Are A and B independent?

$$P(B|A) = P(B)$$

$$0.3846 \neq 0.41$$

NO!

9) $P(A) = 0.6$, $P(B) = 0.34$, $P(B|A) = 0.2$

a) Find $P(A \cap B)$.

$$P(B|A) = \frac{P(A \cap B)}{P(A)} \quad 0.2 = \frac{P(A \cap B)}{0.6}$$

$$P(A \cap B) = 0.12$$

b) Find $P(A \cup B)$.

$$= P(A) + P(B) - P(A \cap B)$$

$$= 0.6 + 0.34 - 0.12$$

$$= 0.82$$

10. An office receives 60% of its ink cartridges from Office Max and the rest from Staples. Suppose that 5% of the cartridges are defective from Office Max. 3% of the cartridges are defective from Staples.

a) What is the probability that an ink cartridge is defective?

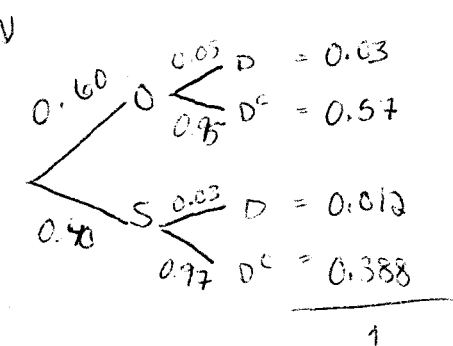
$$P(D) = 0.03 + 0.012 = 0.042$$

b) An ink cartridge is defective. What is the probability that it is from Office Max?

$$P(O|D) = \frac{0.03}{0.042} = 0.7143$$

c) An ink cartridge is defective. What is the probability that it is from Staples?

$$P(S|D) = \frac{0.012}{0.042} = 0.2857$$



11. Random Variables X and Y have the following distributions:

X	1	2	3	4
$P(X)$	0.1	0.1	0.5	0.3

Y	0	1	2
$P(Y)$	0.3	0.2	0.5

Find their joint probability distribution if X and Y are independent.

		Y			
		0	1	2	
X	1	0.03	0.02	0.05	0.1
	2	0.03	0.02	0.05	0.1
	3	0.15	0.1	0.25	0.5
	4	0.09	0.06	0.15	0.3
		0.3	0.2	0.5	1

12. X and Y are random variables with the following joint distribution. Find their individual probability distributions.

		Y		
		2	3	4
X	0	0.2	0.1	0.25
	1	0.05	0.05	0.05
	2	0.09	0.03	0.08
	3	0.01	0.07	0.02

X	0	1	2	3
$P(X)$	0.55	0.15	0.2	0.1

Y	2	3	4
$P(Y)$	0.35	0.25	0.4